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ART 34 AMOT

P A T E N T C L A I M S

1. Filter assembly for ultrafiltration comprising in a pressure vessel one or more filter elements
5 separated by antitelescoping devices (ATD), wherein the filter elements comprises one or more membranes, each consisting of a central permeate spacer covered on both sides by separating membranes, connected at one edge with a permeate pipe and blocked at the
10 three other edges, wound around a central permeate pipe with a concentrate spacer allowing fluid from the space between the wound filter element and the pressure vessel to flow into the wound filter element in an tangential spiralling direction, so that the
15 membranes and concentrate spacers are lying alternating in the wound element; and wherein the inlet to the space between the wound filter element and the pressure vessel is free and the outlet from said space is restricted so that no flow or only a limited
20 flow is allowed from said space to the space after the respective wound filter element c h a r a c t e r i z e d in that, the wound filter elements are provided with means for securing that the pressure at the inlet of the filter element is equal to or lower
25 that the pressure in the space between the filter element and the pressure vessel at the same longitudinal position.

2. Filter assembly according to claim 1,
30 wherein the ATD is formed having a ring abutting to the outlet side of the wound filter element preventing fluid flowing out from the filter element in a distance from the central permeate pipe higher than d, where d is a distance smaller than the radius of
35 the spiral wound membrane element.

3. Filter assembly according to claim 1 or 2, wherein the means for securing that the pressure at

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the inlet of the filter element is equal to or lower than the pressure in the space between the filter element and the pressure vessel at the same longitudinal position is a flow restrictor placed at the inlet to the spiral wound filter element.

4. Filter assembly according to claim 3, wherein the flow restrictor is made in one piece with the ATD.

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5. Filter assembly according to any of claims 1-4, wherein the concentrate spacers are protruding from the separating membranes.

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6. Process for ultrafiltration using a filter assembly according to any of the claims 1-5, where in a cross section at any position along the filter element the pressure in the space between the filter element and the pressure vessel is at least 0.01 bar higher than the pressure inside the filter element.

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7. Process according to claim 6, wherein the pressure difference between the inlet and the outlet of a filter element is in the range of 0.5 to 5 bar/m.

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8. Process according to claim 7, wherein the pressure difference between the inlet and the outlet of a filter element is in the range of 1-3 bar/m.

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9. Process according to claim 6 to 9, wherein fluid to be filtered is an aqueous solution.

10. Process according to claim 10, wherein the fluid to be treated is milk, whey or a fermentation broth.

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11. Anti telescoping device (ATD) for use in a

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filter assembly according to any of claims 1-5, comprising means for securing that fluid can not or only in a limited extend flow out of the space between the proximal filter element and the pressure vessel,
5 means for securing a free flow of the concentrate into the space between the distal filter element and the pressure vessel, and means for restricting flow of concentrate to the inlet of the distal spiral wound filter element in order to secure that the
10 pressure at the inlet of said distal filter element is lower than the pressure in the space between the filter element and the pressure vessel at a corresponding position.